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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/710,729

07/30/2004

Cheng Chang Kuo

13135-US-PA

4728

31561

7590

03/27/2006

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100
ROOSEVELT ROAD, SECTION 2
TAIPEI, 100
TAIWAN

EXAMINER

TRINH, HOA B

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 03/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/710,729

Applicant(s)

KUO, CHENG CHANG

Examiner

Vikki H. Trinh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 December 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6, 8 and 9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8 and 9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Acknowledgement

An amendment filed on 12/22/05 has been considered. However, applicants erroneously indicate that claims 10-13 are withdrawn, because claims 10-13 have been clearly canceled in applicants' response on 07/14/05. Thus, applicants need to make appropriate correction in response to this Office Action.

Claims 1-6, 8-9 are pending in this present application.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

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the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-6 and 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (US 2003/0155572 A1) (hereinafter Han).

Han discloses a LTPS-TFT structure (page 3, paragraph [0037]) disposed on a substrate 1 (fig. 5D) comprising a cap layer 3 (fig. 5D) with a gap 10 (fig. 5D) between the cap 3 and the substrate 1; a polysilicon film 4, 4A, 4B (figs. 5B-5D, and paragraphs [0034], [0038], [0039]) disposed over the cap layer 3, wherein the polysilicon film 4B has a channel region 4B and a source/drain region 7, 6 (fig. 5D) on each side of the channel 4B and the channel 4B is directly over the gap 10; and a gate 12 (fig. 5D) disposed above the channel region 4B of the polysilicon film (fig. 5D). With respect to the average grain size in the channel region, Han does teach the desire of enlarging the grain size at the channel region to make the device more reliable and low leakage current (page 3, [0040, 0041]). However, Han does not explicitly teaches a range of the average grain size in comparison to the gate width, except showing that the width of the gate is smaller than the channel region structure in figure 5D. Nonetheless, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Han with the average grain size of the channel region being larger than the width of the gate, since it is a prima facie obvious to an artisan for optimization and experimentation to enlarge the average grain size of the channel region so that it is larger than the width of the gate in comparison because applicants have not yet established any criticality for having the width of the gate smaller than the average grain size.

Normally, it is to be expected that a change in temperature, or in thickness, or in time, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller 105 USPQ233, 255 (CCPA 19553.

As to claim 2, Han discloses a buffer layer 2 (fig. 5D) positioned between the cap layer and the substrate, so that the gap 10 is positioned between the cap layer 3 and the buffer layer 2 (fig. 5D).

As to claim 3, Han discloses that the gap 10 has a coefficient of thermal conductivity smaller than the coefficient of the thermal conductivity of the buffer layer. Note that the gap is an air gap and the buffer layer is an oxide material (page 2, paragraph [0024]).

As to claim 4, Han discloses that the gap 10 has a coefficient of thermal conductivity smaller than the coefficient of the thermal conductivity of the substrate 1. Note that the gap is an air gap and the substrate is a crystal or glass (page 2, paragraph [0024] and [0030]).

As to claim 5, Han discloses a gate dielectric layer 11 (fig. 5D) disposed over the polysilicon film 4B (fig. 5D).

As to claim 6, Han teaches that the grain size of the channel region 4B (fig. 5D) of the polysilicon layer is on average greater than the grain size of the source/drain region 6, 7 (fig. 5D, and paragraph [0034]).

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5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Han, as applied to claim 1 above, in view of Sun et al. (6,936,848) (hereinafter Sun).

Han in view of APA (Han) discloses the invention substantially as claimed, except that the gate is a dual gate structure.

Sun discloses an analogous LTPS-TFT device having a dual gate structure (col. 2, lines 18-20, and col. 3, lines 45-46).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Han in view of APA with a dual gate structure, as taught by Sun, so as to prevent current leakage (col. 2, line 19).

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Han, as applied to claim 1 above, in view of Peng et al. (6,835,606) (hereinafter Peng).

Han in view of APA (Han) discloses the invention substantially as claimed. Also, Han discloses a dielectric layer (page 3, paragraph [0036] disposed over the polysilicon film 4B (fig. 5D) and the gate 12 (fig. 5D), wherein the dielectric layer (page 3, paragraph [0036] has a plurality of contact windows (contact holes) (page 3, paragraph [0036]); a passivation layer and a source/drain conductive layer (metal connections) (page 3, paragraph [0036]) However, Han does not explicitly teach that the source/ drain conductive layer is electrically connected to the polysilicon film in the source/drain region through the contact window.

Peng discloses an analogous LTPS-TFT device having a S/D regions 210 (figs. 2F, 2G), a channel region 204b of polysilicon film with grains size being larger on average than the S/D regions' grain size, a gate insulating layer 212, a gate 226b over the gate insulating layer, a dielectric layer 228 disposed over the gate, wherein the dielectric layer forms contact windows or

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holes 230 (fig. 2G) to expose the S/D region, a source/drain conductive layer (metallic layer) 232 (fig. 2G) formed over the dielectric layer 228 to electrically connect the S/D region 210, and a passivation layer 236 disposed over the gate dielectric layer and the source/drain conductive layer 232 (See figs. 2F, 2G).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Han with the source/drain conductive layer formed over the dielectric layer to electrically connect the source/drain region through the contact window, as taught by Peng, so as to provide an electrical connection between the conductive layer and the source/drain region through the opening (col. 5, lines 24-26).

Response to Arguments

1. Applicant's arguments with respect to claims 1-6, 8-9 have been considered but are moot in view of the new ground(s) of rejection.

Note, Han discloses the grain size to be larger than 4 um (page 3, [0041]) at the channel region because Han teaches that the larger the grain size is the device gets more reliable against stress due to hot carriers, has more field-effect mobility, and low leakage current. Another note, Han does not explicitly teach that the width of the gate is 10 um in figures 6-7 as applicants claimed.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Vikki Trinh whose telephone number is (571) 272-1719. The Examiner can normally be reached from Monday-Friday, 9:00 AM - 5:30 PM Eastern Time. If

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attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Wael Fahmy, can be reached at (571) 272-1705. The office fax number is 703-872-9306.

Any request for information regarding to the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Also, status information for published applications may be obtained from either Private PAIR or Public Pair. In addition, status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. If you have questions pertaining to the Private PAIR system, please contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

Lastly, paper copies of cited U.S. patents and U.S. patent application publications will cease to be mailed to applicants with Office actions as of June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197 for information on this policy. Requests to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

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**HOWARD WEISS
PRIMARY EXAMINER**